Abstract Submitted
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Understanding flow focusing during the dissolution of porous media[1] LIANG YU, ANTHONY LADD, University of Florida, PIOTR SZYMCZAK, University of Warsaw — Dissolution by subsurface flows is the critical component in the development of karst systems which transport much of the water we consume. Modeling subsurface flow and reactant transport on large (km) scales involves statistical descriptions of the underlying pore space. However, the presence of heterogeneity, particularly fractures, complicates any averaging or homogenization method. More importantly, heterogeneity typically increases with time due to feedback between dissolution and flow, which amplifies and localizes the flow along preferred paths. We are using finite-volume simulations, based on the OpenFOAM toolkit, to investigate the development of these flow paths in simple well-controlled models of a porous material. I will first present a validation of the physical model, by comparing simulations of a dissolving cylinder with the results of a microfluidic experiment. The accuracy of the numerical method, and in particular the evolution of the boundary, was confirmed by comparison with solutions of closely related problems amenable to conformal mapping. Finally, I will present recent results for the dissolution of arrays of disks, which are a simple model of a porous matrix.

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